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(51) International Patent Classification ⁶ : C12N 15/82, 15/54	A3	(11) International Publication Number: WO 98/46776 (43) International Publication Date: 22 October 1998 (22.10.98)
(21) International Application Number: PCT/US98/07114 (22) International Filing Date: 9 April 1998 (09.04.98) (30) Priority Data: 60/041,815 11 April 1997 (11.04.97) US (71) Applicant (for all designated States except US): CALGENE LLC [US/US]; 1920 Fifth Street, Davis, CA 95616 (US). (72) Inventor; and (75) Inventor/Applicant (for US only): DEHESH, Katayoon [US/US]; 521 Crownpointe Circle, Vacaville, CA 95687 (US). (74) Agent: SCHWEDLER, Carl, J.; Calgene LLC, 1920 Fifth Street, Davis, CA 95616 (US).		(81) Designated States: AU, BR, CA, JP, KR, MX, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i> (88) Date of publication of the international search report: 6 April 2000 (06.04.00)
(54) Title: PLANT FATTY ACID SYNTHASES AND USE IN IMPROVED METHODS FOR PRODUCTION OF MEDIUM-CHAIN FATTY ACIDS (57) Abstract By this invention, compositions and methods of use related to β -ketoacyl-ACP synthase of special interest are synthases obtainable from <i>Cuphea</i> species. Amino acid and nucleic acid for synthase protein factors are provided, as well as methods to utilize such sequences in constructs for production of genetically engineered plants having altered fatty acid compositions. Of particular interest is the expression of synthase protein factors in conjunction with expression of plant medium-chain acyl-ACP thioesterases for production of increased levels and/or modified ratios of medium-chain fatty acids in oils of transgenic plant seeds.		

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Katayoon Dehesh
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INTERNATIONAL SEARCH REPORT

Int. l. Application No
PCT/US 98/07114

A. CLASSIFICATION OF SUBJECT MATTER IPC 6 C12N15/82 C12N15/54		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 6 C12N		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 95 06740 A (MAX PLANCK GESELLSCHAFT ;TOEPFFER REINHARD (DE); MARTINI NORBERT (D) 9 March 1995 see page 16, paragraph 1; claim 17	15,22
P,X	LEONARD, J.M., ET AL.: "A Cuphea beta-ketoacyl-ACP synthase shifts the synthesis of fatty acids towards shorter chains in Arabidopsis seeds expressing Cuphea FatB thioesterases" THE PLANT JOURNAL, vol. 13, no. 5, March 1998, pages 621-628, XP002081429 see the whole document	15,22, 29-32
-/--		
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
* Special categories of cited documents : <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"Z" document member of the same patent family</p> </div> </div>		
Date of the actual completion of the international search <div style="text-align: center;">20 October 1998</div>		Date of mailing of the international search report <div style="text-align: center;">02/11/1998</div>
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer <div style="text-align: center;">Maddox, A</div>

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>DEHESH, K., ET AL.: "Production of hgh levels of 8:0 and 10:0 fatty acids in transgenic canola by overexpression of Ch FatB2, a thioesterase from Cuphea hookeriana"</p> <p>THE PLANT JOURNAL, vol. 9, no. 2, 1996, pages 167-172, XP002081430 see page 170, column 2, paragraph 2</p> <p style="text-align: center;">---</p>	15,22
A	<p>DEHESH K ET AL: "TWO NOVEL THIOESTERASES ARE KEY DETERMINANTS OF THE BIMODAL DISTRIBUTION OF ACYL CHAIN LENGTH OF CUPHEA PALUSTRIS SEED OIL"</p> <p>PLANT PHYSIOLOGY, vol. 110, 1996, pages 203-210, XP002014020 see page 209, column 2, paragraph 2</p> <p style="text-align: center;">---</p>	15,22
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INTERNATIONAL SEARCH REPORT

International Application No

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 94 10189 A (CALGENE INC) 11 May 1994 see page 5, line 34 - line 36 ---	15,22
A	WO 92 03564 A (CALGENE INC) 5 March 1992 see page 22, line 19 - line 23 ---	15,22
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 98/ 07114

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Claims Nos.: 1-14,19,20,21,26,27,28

Remark : Claims 1-14 were not provided to the ISA at the time of search and hence the subject matter of these claims and the dependent claims 19,20, 21,26,27,28, could not be defined.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. J. Application No

PCT/US 98/07114

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